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ABSTRACT

A study examined some of the ways in which vocational education has sought to ensure students a higher degree of preparation in the basic academic subjects at both the secondary and postsecondary levels. Various Ohio programs as well as programs in New York, Virginia, and Michigan were examined. Special attention was paid to Ohio's Program Options model, developed in 1985 as a vehicle for strengthening academics in vocational education by providing vocational educators with more options for increasing the focus on academics in vocational classrooms. The program features three instructional options that differ with respect to level of state reimbursement and relative amounts of instruction provided by vocational and one or more academic subject teachers. The implementation of Program Options in one joint vocational school was examined in detail, and the program's statewide implications were assessed. The following conditions were found to be associated with successful implementation of the Program Options model: selling the program, minimizing job insecurity, emphasizing teamwork, involving both academic and vocational instructors in the program, individualizing instruction, and stressing more applied academics rather than simply stressing more academics. A series of recommendations for implementing Program Options in Ohio schools was developed. (MN)

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STRENGTHENING ACADEMICS

IN VOCATIONAL-TECHNICAL EDUCATION IN OHIO

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FOREWORD

The mathematics, science, and communications skills essential to the successful performance of occupational tasks are currently the focus of intense scrutiny. This is not a new development so much as a reconciliation between two partners in a marriage subject to many pressures.

Most educators have viewed vocational education and academic education as complementary. They say that vocational education requires the application of academic skills to specific job tasks. But others have not seen such a close relationship between the academics and vocational education.

Meanwhile, a number of forces have converged to focus both viewpoints on the overriding need to give today's vocational students a firmer grounding in the basic disciplines that are applicable to their vocational choices. The "mutually exclusive approach to curriculum is no longer applicable," Dr. Darrell L. Parks and Dr. Gail H. Henderson, of the Ohio Division of Vocational and Career Education,[1] have written in proposing the alternative that is the subject of this report.

This report, which was prepared by Dr. Lucille Thrane and Frieda Douthitt, examines some of the ways in which Ohio's vocational and technical schools, as well as those in several other states, are answering the demand to infuse more applied academic learning into the vocational-technical curriculum. The Ohio Council on Vocational Education believes that the reader will find this report to be informative and encouraging.

Joseph L. Davis
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EXECUTIVE SUMMARY

Through this study, the Ohio Council on Vocational Education examined some of the ways that vocational education has sought to ensure students a higher degree of preparation in the basic academic subjects, as applied to vocational disciplines, at both the secondary and postsecondary levels.

Various approaches for incorporating more academic instruction in vocational education -- including Ohio's initiative, "Program Options" — are presented. The implementation of Program Options in one joint vocational school district is described in some detail, and the statewide impact of the program is presented.

Conditions that characterized successful implementation of Program Options were: (a) selling the program, (b) minimizing job insecurity, (c) emphasizing teamwork, (d) involving both academic and vocational instructors, (e) individualizing instruction, and (f) stressing more applied academics, not just more academics.

Some of the recommendations emerging from the study are as follows:

- Adopt a "can-do" attitude toward improving the academic components of vocational-technical education.
- Communicate internally and with the media.
- Allow sufficient time for the applied academic and vocational teachers to meet.
- To the extent possible, accommodate disparities in learning abilities.
- Provide a vocational/special education coordinator or a remediation teacher to help disadvantaged and handicapped students.
- Cluster students from various vocational programs only when the disciplines share a common core of academic knowledge.
- Allow both applied academic and vocational teachers to enter industry periodically for work experience in the area of occupational instruction.
- Explore alternative ways of integrating academic and vocational education for those schools that have not had success with Program Options.

While overall data are encouraging, Program Options has delivered some intangible benefits as well — broadening opportunities for academic as well as vocational students, expanding the meaning of the academic subject matter, fostering a better image for both vocational and traditional education, and equipping graduates to make applications of, and see relevancy in, newly evolving knowledge.

A GROWING CONCERN

The forces for strengthening the academic components of vocational education can be traced in part to the renewed interest in public education that followed the 1983 publication of A Nation at Risk, the National Secondary Vocational Education Commission's The Unfinished Agenda, and other reports of the early 1980s that found fault with public education. At the same time, many workers, employers, students, and educators did not need to get this news from written reports. They were living it.

They were finding first-hand that the average person changes jobs five to seven times in his working life.[2] They were facing lay-offs or early retirement from jobs that had become obsolete. As job-hunters, they found themselves inadequately trained for entry-level jobs in a work place where technology is advancing so rapidly that workers must not only enter the work force with a higher level of training, but also must be able to learn new skills long after their formal education is finished.

Both employers and postsecondary educators have said graduates need to be better prepared in the basics, to be more flexible, and to be equipped for lifelong learning.

At the local level, employers have repeatedly expressed the need for academic skills as foundational to vocational skills. One of the vocational school systems that will be featured in this report conducted an exhaustive employer survey in 1979.[3] The results showed that, several years before the critical studies were making national headlines, employers were asking for graduates who were:

- More flexible,
- More capable of making lateral career changes,
- More capable of moving up the career ladder, and
- More skilled in math, writing, and learning how to keep on learning.

Employers in many of today's technologies demand skill levels beyond those provided by traditional high school vocational technology programs, but less than those associated with baccalaureate degrees. Along with this new mid-level of training, employers are increasingly stressing employees' ability to communicate effectively in both written and spoken forms as well as the concomitant capacity to think critically and solve problems.

Colleges and postsecondary institutions are advising students that those seeking associate or baccalaureate degrees must meet minimum standards of mathematics, science, and English proficiency when they first begin postsecondary work.

"Frankly," writes the president of a two-year technical college in answer to a research query for this report, "I can assure you we are concerned about what is an apparent lack of academic preparation of vocational students seeking admission to higher education in general. . . . While some of our technical instruction is skill oriented, a significant proportion is academic in nature. In addition, courses in math, science, psychology, and English are required components of our programs."[4]

Students themselves, realizing that they will need to be able to continue to learn if they are to make a living in a world where change is the only constant, saw that school is not an end in itself. They wanted and needed more educational options that they could exercise later in their lives than the 10th grade. They wanted to be able to cross over between the academic and vocational disciplines, to pursue postsecondary education after vocational school, and to be dually prepared so that they could enter either college or a job as the course of their lives dictated.

Across the nation, schools answered by raising standards. Forty-five states raised the number of credits required for graduation, with the additional credits to be taken in traditional academic subjects. Effective September 1, 1987, Ohio increased to 18 the number of credits requisite for graduation. These changes in standards have placed vocational students at a disadvantage. Instead of expanding their options, it has made it more difficult for many of them to earn the required graduation credits and still spend sufficient hours in vocational training.[5]

Congress responded by enacting the Perkins Act, which provides that states may use funds for:

> the conduct of special courses and teaching strategies designed to teach the fundamental principles of mathematics and science through practical applications which are an integral part of the student's occupational program.[6]

Parks and Henderson speak for a host of vocational educators when they interpret this and other provisions of the Perkins Act to mean an end to the academics vs. vocational dichotomy and a beginning of stronger academic foundations on which to build vocational careers in a complex, changing world.

Purpose and Design of This Report

This report examines some of the ways that vocational education has sought to ensure vocational graduates a higher degree of preparation in the basic academic subjects, as applied to vocational disciplines.

Having outlined the background of the movement to strengthen academics, the report turns more specifically to the history of this issue in Ohio. Following this background discussion, the report moves from general to specific, from various approaches for incorporating more academic instruction in vocational education, to the Ohio initiative, Program Options.

Several of the pilot programs that gave rise to Program Options are described in brief, along with alternatives that have been devised in cooperation with labor, private industry, and postsecondary schools. These descriptions cover design, process, and results, where available.

Finally, one of the Program Options pilots is discussed in detail, with emphasis on the components that have made it successful. An analysis of these components yields recommendations for "next steps" in strengthening the academic components for all Ohio vocational students.

Background of Ohio's Efforts to Strengthen Academics

The Ohio movement to strengthen the academic components of vocational education predates both A Nation at Risk and the Perkins Act by several years. In 1978, the Ohio Legislative Service Commission studied employers' opinions of the quality of vocational education their employees had received. Among its findings (most of which were positive) was a conclusion that "employers tended to value basic academic skills more than did graduates, teachers, or administrators."[7] The Commission's report caused the legislature to ask the Ohio Department of Education to "determine whether the importance of academic skills is sufficiently emphasized to students in all curricula."[8]

The Ohio Advisory Council for Vocational Education took up this assignment, performing an exhaustive analysis of the relationship between Carnegie units of English and math coursework completed in high school with performance levels on the Short Form Test of Academic Ability (SFTAA). The Council's findings:

> The units of English appeared to be significantly related to performance on the writing skills measure, but a mixed pattern emerged for the reading test. Math credits completed during high school appeared to have a much more dramatic impact on performance. . . . Significant differences remained between students who completed only the one unit required for graduation and those who exceeded that requirement.[9]

The report concluded:

> Both vocational and academic education teachers must share responsibility for strengthening vocational students in the basic skills in the 11th or 12th grades when they are enrolled in vocational education programs. In fact, Ohio Division of Vocational Education staff leaders initiated curricular plans at the beginning of the 1980-81 school year to strengthen the basic skills for students in vocational education.[10]

VARIOUS APPROACHES TO STRENGTHENING ACADEMICS

In 1983, a letter went out from the Division of Vocational and Career Education to eight local and joint vocational school districts, inviting superintendents and vocational directors to propose pilot programs incorporating strengthened academics. The Division approved nine "deliberately unconventional" pilot projects with the conditions that they be occupationally specific in instructional content and design and include a nonlaboratory instructional component designed to:

- Reinforce basic skill competencies;
- Support the overall occupational and employability needs of students in a changing work world;
- Establish a foundation for training and retraining throughout a student's working lifetime, particularly in the areas of math, science, and communications;
- Complement recently modified state high school standards;
- Enhance crossover opportunities for college-bound students; and, finally,
- Be cost-effective.

The Pilot Programs in Brief

Three Ohio pilot projects were based upon a blending of selected academic subjects with vocational instruction. All used academic subject matter specialists in some way and involved a staff team approach. In all three projects, students received academic and vocational credit.

The pilot project of a county joint vocational school in north-central Ohio featured team teaching. The team involved a subject matter specialist and vocational teachers. The specialist helped the vocational teachers identify the math principles and competencies to be taught in various vocational programs.

The pilot program of a mid-sized city school district involved participation in a national consortium focusing upon the teaching of applied physics to vocational students. Principles of physics were taught by a certified science teacher working closely with the vocational education teacher to assure application of subject matter content to the real occupational world.

A southwestern Ohio jointure extrapolated math, science, and communications principles from a cluster of occupational programs and organized them into science, math, and language arts curricula taught by subject matter specialists during the block of time set aside for vocational instruction. This pilot project will be described in depth later in this report.

A county JVS in southwestern Ohio used a cluster approach, bringing students of different vocational programs together for common instruction.

A southern Ohio tri-county jointure developed a competency-based curriculum, then gave half the seniors traditional instruction while the experimental half pilot-tested the competency-based materials. Achievement levels of the two groups were compared.

A northwestern Ohio five-county JVS started an Academic Preparation Option (APO) program in which students entering with Algebra I and plane geometry could choose to take advanced math, English, or chemistry. APO students were released one period daily to take the advanced academics.

Another JVS employed a certified math instructor to teach math skills within the vocational time block.

A city school district released students at its four career centers to pursue an additional academic course in a comprehensive high school.

Early results of the pilot projects showed improved test scores and increased student and teacher motivation. One junior food service pilot group showed an average of 93 percent improvement. An academic teacher marvelled at the enthusiasm and confidence of the vocational students in the pilot project compared to the blasé attitudes of students in the academic track.

"Classroom test scores and increased motivation seemingly translate into students who will more satisfactorily meet employment needs and employees who can adapt to change and move more swiftly up the career ladder. Additional time is needed to see this assumption come to reality," reported Parks and Henderson.[11]

Other States and Other Approaches in Ohio

Ohio was not the only state to explore ways of strengthening the academic components of vocational education. In many states, the effort was motivated by the wish to mitigate the handicap that higher graduation standards placed upon vocational students.

New York's higher requirements included two units in mathematics and two units in science. Effective September 1, 1985, however, the regulations were modified to allow students pursuing an approved sequence in occupational education and a local diploma to satisfy one of the two required units in one or both of these subject areas by completing a course in occupationally related mathematics or science.[12]

Virginia students are permitted to fulfill the math and science requirements by completing a state-approved 300-hour instructional sequence in specified vocational programs.[13]

In Michigan, personnel in local districts and vocational and technical educators are identifying where academic competencies are being taught in the vocational and technical curricula and granting waivers or exemption from some math, science, and language requirements for students enrolled in these courses. The state board of education has endorsed the approach, but the Michigan State Advisory Council for Vocational Education has observed, "without a plan for implementation or an incentive, it is doubtful that many districts will implement the recommendation."[14]

Many school districts have devised "2+2" programs in conjunction with local postsecondary institutions. The key structural elements of the 2+2 program are:

- A formal articulation agreement outlining the details of close coordination between high school and college curricula;
- A sequence of applied courses in the basic skills that are intentionally preparatory in nature;

- Instruction by high school teachers during the first two years of study but with provision for student access to college staff and facilities when appropriate; and
- Use of career clusters and a technical systems study approach in which students have a clearly defined view of the four-year structure of their program of study.

Exemplary 2+2 projects include a program to train broadly educated master technicians in Newport News, Virginia, and a training program in agriculture education in Bakersfield, California.[15]

Among Ohio postsecondary schools, one of the southeastern community colleges, in cooperation with local secondary schools and businesses, instigated a Future Assessment Skills Training (FASTrak) model in which high school juniors explore career experiences that are designed to:

- Enhance the retention rate;
- Encourage selection of the college's tech prep and associate degree programs;
- Increase basic skills competencies; and
- Develop work attitudes and skills in part-time employment.

In other Ohio postsecondary efforts to strengthen the academic components, a southern Ohio community college has developed a large GED testing center and an adult basic education program to complement its vocational and technical education programming. Another community college is working with the Ohio Department of Education to design a pretechnical education program that will include courses in principles of technology and critical thinking. This program will emphasize better preparation in math and science for students who are reluctant to enroll in traditional math and science courses.

One community college serves as headquarters for Training, Research, and Assistance Cooperative Extension Services (TRACES), with a network of 19 public- and private-sector organizations that provide consultation, technical and management assistance, information dissemination, and training for area citizens, businesses, and industries.

Despite this activity, the most visible effort to strengthen the academics in vocational education has been at the secondary level. This does not mean, however, that all secondary-level approaches fall under the Program Options umbrella.

Cleveland has a program called TEC-MEC (for Total Education Concept — Manufacturing-Enhanced Curriculum) that is a cooperative effort of the schools, local industries, and the Cleveland Machine Trades Association. TEC-MEC offers Algebra II, trigonometry, and physics taught by certified teachers in a manufacturing technology lab that was upgraded from machine shop in both content and teaching. A certified vocational teacher teaches the lab.

Another feature of TEC-MEC is a "job bank" for placing graduates with cooperating employers. The program has started to serve its first group of 12th graders, and over 400 Cleveland area employers have been notified that the job bank is now open, that there is a special hotline number they can use, and that TEC-MEC students will soon be available.

The Ohio Model: Program Options

Two factors besides the success of the early pilot projects influenced the direction Ohio would take in strengthening the academics in vocational education. They were Keeping Vocational Education at Work, the report of the Blue Ribbon Committee on Secondary Vocational Education in Ohio, and Master Plan for Excellence, a goal statement by the State Board of Education proposing that by 1990, secondary vocational education in Ohio:

- Reach 50 percent of the high school population;
- Prepare youth for postsecondary education or employment at a rate to exceed the general youth employment rate by at least 10 percent; and
- Prepare students in math, science, and communications skills appropriate for entry-level positions as well as for postsecondary education.

Ohio's Program Options Model was developed in 1985. It was designed to fulfill the goals and recommendations in these documents. Elements in the design may be traced also to the early results of the pilot projects described previously.

Program Options featured a variety of selections for the consideration of vocational educators who were interested in strengthening the academic components of their programs. These options are adapted from types of daily vocational class schedules that have been used in Ohio for some time. The three traditional approaches to vocational class scheduling are known as Type 00, Type 01, and Type 02 programs (see Figure 1).

In the Type 00 program, a vocational teacher provides instruction in a vocational laboratory for a minimum of 150 minutes (2½ hours) each day. This same teacher also provides instruction in vocational-related subject matter for the equivalent of two regular class periods daily. This technical content relates specifically to the hands-on experience the students receive in the vocational lab. For example, a vocational agriculture teacher might use his vocational-related class periods to explain various types of herbicides, different kinds of application, and the mathematics needed to compute the ratios for proper mixtures of these herbicides. During the vocational lab, the teacher would demonstrate how to mix the herbicide, how to service and calibrate the sprayer, and how to apply the herbicide. The students would then have an opportunity to practice these skills, under the teacher's supervision.

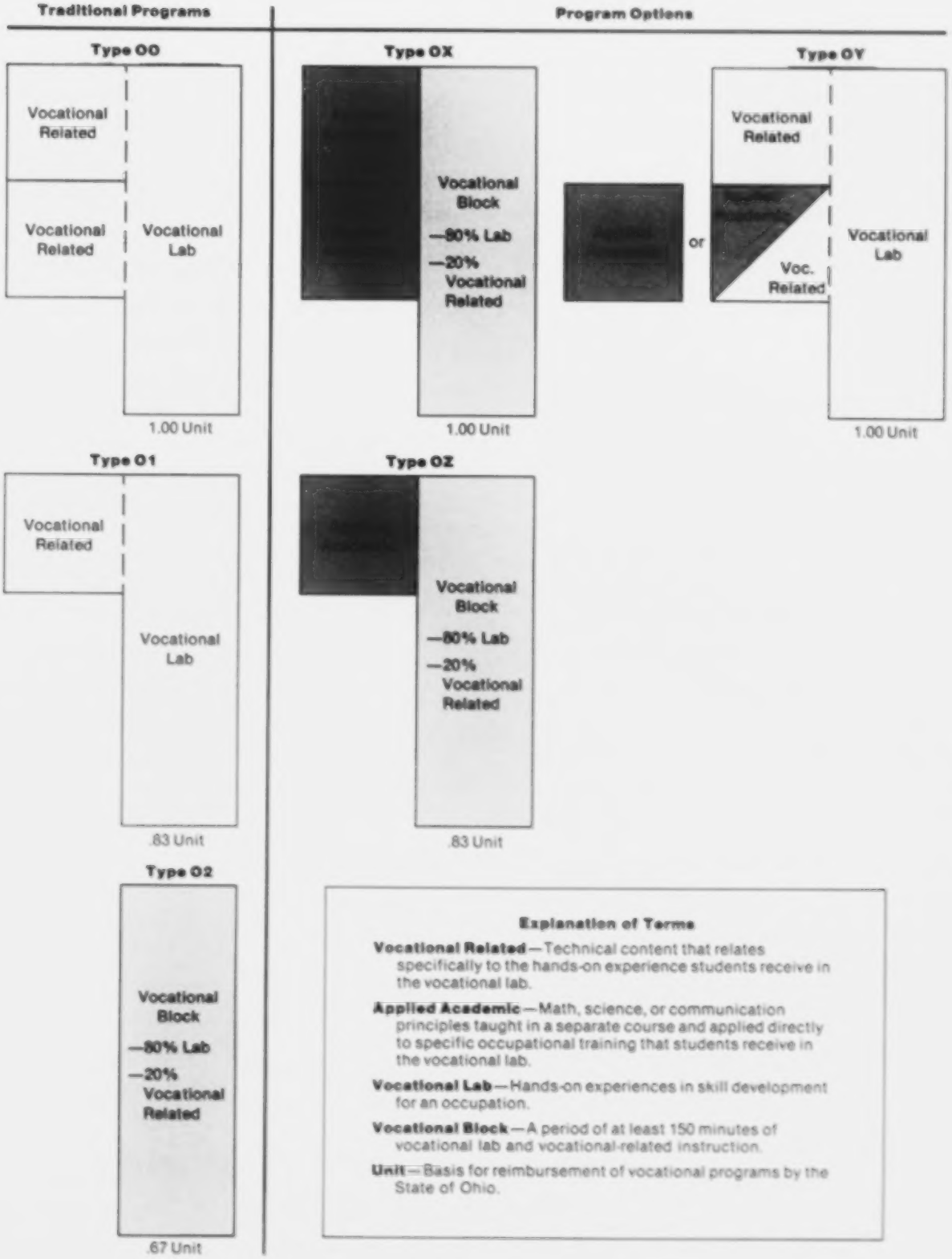
Type 00 programs receive one full unit of financial reimbursement from the state.

Type 01 programs are identical to Type 00 programs with two exceptions: Only one class period of vocational-related instruction is provided in addition to the vocational lab, and the state reimbursement drops to .83 of a unit.

Type 02 programs are provided entirely within the vocational-laboratory block of time, which lasts at least 150 minutes each day. No additional vocational-related courses are taught. Instead, the vocational lab teacher allocates 80 percent of the time to hands-on lab experience and 20 percent to related technical instruction. Also, the state reimbursement drops to .67 of a unit.

Program selections offered under Ohio's Program Options featured three new approaches, known as Type OX, Type OY, and Type OZ programs, all of which are somewhat more complex than the traditional program types. (See Figure 1)

Figure 1. Vocational Program Daily Schedule Types


Traditional Programs
Program Options
Type OO
Vocational Related
Vocational Related
Vocational Lab
1.00 Unit
Type OX
Vocational Block
—80% Lab
—20% Vocational Related
1.00 Unit
Type OY
Vocational Related
or
Voc. Related
Vocational Lab
1.00 Unit
Type O1
Vocational Related
Vocational Lab
.83 Unit
Type OZ
Vocational Block
—80% Lab
—20% Vocational Related
.83 Unit
Type O2
Vocational Block
—80% Lab
—20% Vocational Related
.67 Unit
Explanation of Terms
Vocational Related — Technical content that relates specifically to the hands-on experience students receive in the vocational lab.
Applied Academic — Math, science, or communication principles taught in a separate course and applied directly to specific occupational training that students receive in the vocational lab.
Vocational Lab — Hands-on experiences in skill development for an occupation.
Vocational Block — A period of at least 150 minutes of vocational lab and vocational-related instruction.
Unit — Basis for reimbursement of vocational programs by the State of Ohio.

In providing a Type OX program, at least two, and perhaps three, teachers are involved. The vocational teacher is responsible for providing a minimum of 150 minutes of instruction each day in the vocational lab. This teacher allocates 80 percent of the time to hands-on experience and 20 percent to related technical instruction. In addition, one or two other teachers provide instruction in two applied academic subjects for the equivalent of two regular class periods. An applied academic course is one that has been created by first identifying the math, science, or communication principles and technical subject matter existing in a vocational curriculum. These principles and technical information are then taught in a separate class but the subject matter is applied directly to the occupation and correlated with students' hands-on experiences in the vocational laboratory. Type OX programs draw a full unit of financial reimbursement from the state.

Type OZ programs are identical to Type OX programs, with two exceptions. In addition to the instruction provided by the vocational lab teacher, only one applied academic subject is offered. The other difference is in the level of state reimbursement; Type OZ programs are reimbursed at .83 of a unit.

Type OY programs appear to be the most complicated arrangement of all. The vocational-lab teacher provides a minimum of 150 minutes of lab instruction each day. In addition, this same teacher provides vocational-related instruction for the equivalent of a regular class period.

An applied academic subject is also provided, but it may be offered for either a full academic credit or for one-half credit during the course of a school year. For one-half credit the applied academic course is offered twice a week during one semester and three times a week in the other semester, alternating with additional vocational-related instruction on the remaining days of the week.

Regardless of the configuration employed, Type OY programs are reimbursed by the state at the level of a full unit.

In each of the Program Options, OX, OY, and OZ, teachers of the applied academic courses and vocational courses must be properly certified in their respective areas. Vocational teachers may gain certification to teach applied academic courses in their program.

From the diversity of selections available under Program Options, it may safely be deduced that the state is making a serious attempt to respect local conditions while attempting to encourage vocational educators to strengthen the academic components of their program.

Once the Program Options model was developed and approved, state staff took very specific steps to secure ever-widening awareness of and support for the new options. First, they presented the approved model to local superintendents and directors for discussion. Based on that discussion, they made final adjustments and developed an implementation process.

At this point, they started providing inservice sessions, first to orient the State Division staff and next to orient local vocational directors and supervisors. The local schools made their decisions on whether or not to get involved. Those that decided to do so submitted letters of intent. Inservice sessions for participating vocational and academic staff followed in June, allowing staff members with extended service time several months to develop a course of study for implementation in the fall.

State staff chose the administrative mode of support, not mandate. The decision to participate was a local one. Thirty-two districts decided in the affirmative. In Program Options' first year of operation (1985-86), 23 of the 32 school districts initiated an option; six were in planning stages; and three were uncertain what direction they would take.

In the second year (1986-87), twelve school districts initiated the new structure, bringing the total to 35. The grand total of participating vocational classes was 308 in 1985-86 and 411 in 1986-87.

Program administrators feel that it is still too early to compare junior and senior enrollments in specific school districts to determine if the initiation of Program Options is having an impact upon the junior-year vocational enrollments. School districts are still in the formative stages of determining which programs can support applied academics. Classes are added and deleted annually.

Overall data, however, are encouraging. The total enrollment in applied academic courses increased from 4,093 in school year 1985-86 to 6,625 in Program Options' second year.

Not all benefits permit such precise measurement. Program Options has delivered some intangible benefits as well — broadening opportunities for academic as well as vocational students, expanding the meaning of the academic subject matter, fostering a better image for both vocational and traditional education, and equipping graduates to see the application and relevancy of newly evolving knowledge.[16] In short, Program Options has proved to be effective in doing what it was designed to do.

One Response to the Program Options Opportunity

In response to the opportunity afforded by Program Options, a joint vocational school district initiated a limited experimental program in 1982, involving five vocational programs that required varying levels of math and science: chef training, dental assistant, electronics, industrial maintenance, and welding.

The 10 teachers involved were chosen for their teaching skill, their openness to change, and their stick-to-itiveness. With the success of the experimental effort, the program was implemented in the 1983-84 school year.

Program Structure. The district chose a Type OX option — a vocational lab and two applied academic classes. During the experimental and pilot stages, the lab was three hours and the classes were 50 minutes. At present, more scheduling options are offered. In all cases, the vocational lab is taught by a vocational instructor, and applied academic classes are taught by teachers certified in those areas.

In the junior year, students take the vocational lab (80% lab work and 20% technical information), applied math, and applied science (Principles of Technology or biological and chemical science). They also take a regular English course and a course in employability skills/entrepreneurship.

Seniors take the vocational lab, applied math or science, and a technical writing course. Credit in English is granted for the technical writing course. The math or science and technical writing content flows from the vocational course of study. Seniors also take a social studies course and a course in employability skills/entrepreneurship.

The Change Process. Recognizing that change is a process and not an event, the district made full use of the change process in introducing Program Options, securing support from each level of the administrative hierarchy, involving all those affected in substantive ways, and providing the time and support needed for change.

"We didn't just use a telling model," reports the project director. "District staff were encouraged to offer suggestions, air grievances, and raise questions. And once the program was underway, we didn't stop our communication efforts. Twice a year, we met with home school principals and counselors to keep them apprised of how the efforts were progressing. We worked closely with members of the [district's] Council on Vocational Education to secure their input and involvement throughout the changeover. As the implementation efforts expanded, we went back to the original pilot-program people continually."

Job Security. The district allowed each school a six-year transition period in which to develop and implement the program and each individual program two years in which to come up to speed. This pace allowed participants ample time to accept the change, develop curriculum, and make refinements.

Under the old system there were 12 vocational instructors and two academic instructors for every six programs. Under the new system, there are six vocational instructors; six academic instructors (of the six, some teach applied academics, the others teach regular academics); and one instructional coordinator for every six programs. To make the transition by simply "dumping" vocational staff would have created irreparable damage.

Instead, "redundant" staff have six years in which to retire, to find other employment, to move to adult education, or, with help from a tuition reimbursement program, to obtain academic certification and "convert" to one of the applied academics or coordination positions.

Curriculum Development. Project leaders identified both common-core basic-skills competencies across occupations and competencies specifically applicable to one program or cluster of programs. They started with an available occupational analysis and used an advisory committee to help modify the task list for local conditions. Then academic and vocational teachers worked together to complete a three-step process of task analysis, identification of objectives, and identification of competencies needed to meet the objectives.

Vocational instructors and their supervisors reviewed existing courses of study to determine the content to be covered in each of the two years of the program. Then they sequenced the content into duty blocks (job functions) and task areas, and identified overall objectives and competencies for each block. The last task was the most challenging: identifying the math and science skills for each duty block. Not being fully versed in math and science theory, the vocational instructors sometimes struggled with terminology, concepts, and structure.

Once the vocational instructors had done their part, math and science specialists analyzed the identified math and science skills. They, too, organized the skills into duty blocks and task areas, with objectives and competencies. Finally, they sequenced the math/science duty blocks and tasks to correlate with those in the vocational course of study. Thus, the vocational curriculum determines the specific math and science concepts to be taught.

Teamwork. Next, time was provided for the vocational and academic instructors to work together to design strategies and develop projects integrating math/science concepts into the occupational application. Decisions were made, sometimes with difficulty, the project director reports, about who would teach which part and which materials and instructional methods would be used.

In the pilot stage, all vocational and applied academic instructors were put together in one large planning area, which proved to be beneficial in developing team spirit. Teaching teams were also required to meet for 10 minutes a day — to touch bases, to compare progress, to communicate. After three to four months, they made daily contact voluntarily.

Vocational instructors, to keep technically up-to-date, had been required to make two industry visits per quarter. Now they were encouraged to take the academic instructors with them on the visits. This helped build team spirit as well as overcome one of the perceived weaknesses of the program: that the academic instructors lack the on-the-job technical experience needed to come up with occupational applications.

Program Delivery. The average class size is 18 students. Instructional staff conduct home visits to acquaint students and their parents with program goals and expectations prior to students' entering the program. Students also take a series of pretests to establish competency profiles. Math skills are tested by using the McGraw-Hill/CTB math test; typically only 19 percent pass. English and science levels are determined by using the Stanford Diagnostic Test of Basic Skills. To support students who desire or need growth in math, science, writing and reading, the district is establishing a computer-aided instruction program that is competency based.

Many students come to this school with poor basic skills, so it is considered important to individualize instruction. To do this, academic and vocational teachers are given three to five weeks during the summer or two hours a day during the school year to develop learning activity guides (LAGS), teacher activity guides (TAGS), job task sheets, procedure sheets, and the like.

The LAGS/TAGS curriculum format is totally computerized. By filling out a data entry packet and adding the support materials, the staff produces:

- A learning activity guide,
- A teacher activity guide, and
- A curriculum resource guide.

The LAGS/TAGS approach has been found to have another benefit besides individualizing instruction. When vocational instruction time dropped from four and a half to three hours per day, "there was a certain amount of panic," the project director reports. "Granted, they no longer had to use their time to teach applied math and science, but they still felt they wouldn't have time to cover the content." Advisory committees reviewed the competencies to be included, thus ensuring that the course content was pared to the essentials.

A third consequence has been that students are now required to do more individual work outside class and to prepare job plan sheets, which give directions for doing a series of operations or procedures involved in a complete job. "In short, students are asked to take more responsibility for their own learning," says the project director.

Results. Both staff and students are becoming convinced of the merits of integrating academic and vocational instruction. Teachers say that working together makes for a more meaningful day and that the students benefit from having access to three experts rather than just one. Students in the experimental groups scored higher on achievement tests and technical performance tests than did students in the control group. They were also more highly motivated and had lower rates of absenteeism.

CONDITIONS THAT PROMOTE SUCCESS

Many of the reasons the Program Options model succeeded as well as it did can be summed up in four letters: T-I-M-E. The leaders took time to "sell" their idea from the top down; they gave all those who would be involved and affected time to adjust to the change, to prepare themselves for new and different roles, so that job insecurity was minimized; they took time to individualize instruction; they gave academic and vocational teachers the added time it takes to teach effectively as a team. In short, they took time to do their job well.

Selling the Program. The fact that the Program Options district described in detail previously has an associate superintendent with a marketing and distribution background undoubtedly figured in the pilot's success. Starting when the program did not yet exist on paper, planners were careful to introduce their ideas from the top down, while soliciting and using suggestions for its implementation from the bottom up.

They first sought — and received — the approval and support of appropriate people at the State Department, then of their board of education, and thirdly, from their Council on Vocational Education, made up of 24 chief executive officers of business and industry.

They then obtained the approval of local superintendents, and met with staff prior to announcing the pilot program. "We worked with staff who would be involved to explain how the proposed program would affect them, and we worked with principals and counselors in the home schools to coordinate efforts," says the project director.

Minimizing Job Insecurity. One effect of this pyramidal marketing of the pilot idea was to quell anxieties about what would happen to "redundant" staff. The pilot would have been doomed at the start had it been perceived as a threat rather than a challenge.

Teamwork. Team teaching was a key ingredient in this district's success formula. Not only did the teachers perceive this approach as synergistic — that is, achieving more than they could have by acting alone — but it was a chief "selling point" with students. "Students are more sold on the idea that the subjects are interrelated when they see their instructors working as a team," says the project director.

Involvement. Involving instructors in the curriculum development process prepared them for change. When the actual change took place, they were ready for it, because they had helped fashion it. Involving both academic and vocational instructors in curriculum development got them ready for team teaching.

Individualization. Because vocational schools draw their students from a number of communities and home schools, they may come with all degrees of preparation in the basic subjects. Therefore, the pilot instructors felt, it is crucial that the curriculum be individualized to the extent that is possible. Teachers were given extra time to develop individual learning activities that could be entered and accessed in a computerized, competency-based, individualized instruction program.

Not More Academics, But More Applied Academics. One final but very significant factor in this success story is that all of the players maintained their focus on their original objective: to strengthen the academic components of vocational education by teaching applied academics. That they were able to do so may be a function of the team teaching approach.

"Both experimental and control groups involved in the pilot efforts showed that as soon as students don't see the relationship between math, science, and their vocational training, they draw back from learning math and science," observes the project director.

The same caveat is expressed by Parks and Henderson in "Strengthening the Academic Foundations of Vocational Education Programs: A New Charter — A New Look." When asking for better trained graduates, "business and industry representatives did not request more academics per se but applied academics. . . . They did not request more academics — a quantitative crevice out of which many critical education reviewers have not yet climbed."

WHAT ARE THE "NEXT STEPS"?

Vocational educators were able to draw other inferences from their pilot experiences with Program Options. Perhaps the most often-sounded advice to those undertaking to strengthen academics in vocational education is to think positively, to view the "glass as half full instead of half empty," to adopt a "can-do" attitude.

"To counteract shell shock and negativism [from criticism that educators have been subjected to in recent years] . . . your energies must be spent, not on defending what you've done in the past against media onslaughts, but on accepting the challenge offered — the opportunity to improve education and the image of vocational education," states a National Center for Research in Vocational Education article.[17]

Other recommendations are to:

- Communicate both internally and to the media. Strengthening the academic components of vocational education has potential for enhancing the image of education in general and vocational education in particular.
- Deal forthrightly with the job security issue. Vocational teachers may be encouraged to achieve dual certification. Some school districts are paying tuition costs to encourage this trend. Staff reductions, where necessary, should be made through attrition.
- Allow sufficient time for the vocational and applied academic teachers to meet on a not-less-than weekly basis. The equivalent of one class period of coordination time per week is a minimum. Having applied academic teachers and vocational teachers sit in the same office area enhances communication.
- To the extent possible, accommodate disparities in learning abilities. They become more apparent with Program Options. With sufficient enrollment, it may even be possible to offer two levels of instruction.
- Other ways of assuring that disadvantaged and handicapped students experience some success in applied academics are to provide a vocational/special education coordinator, who can furnish appropriate classroom materials, or a remediation teacher, who can provide tutorial assistance as needed.
- Clustering should be done only with vocational disciplines that share a common core of applied academic knowledge, and instruction should make application to each occupational area.

- Consider allowing both applied academic and vocational teachers to enter industry periodically to participate in a 40-hour work week. It may also be useful to let vocational and applied academic teachers trade places occasionally to gain an appreciation of each other's area of expertise.

- Communicate with home school administrators to help them understand how vocational students may be unfairly disadvantaged if academic credit is not sanctioned for their work in applied academics. A few local districts have agreed to grant elective credit rather than required graduation credit.[18]

- Explore alternative ways of integrating academic and vocational education for those schools that have not had success with Program Options.

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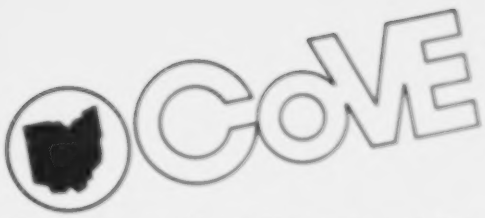

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